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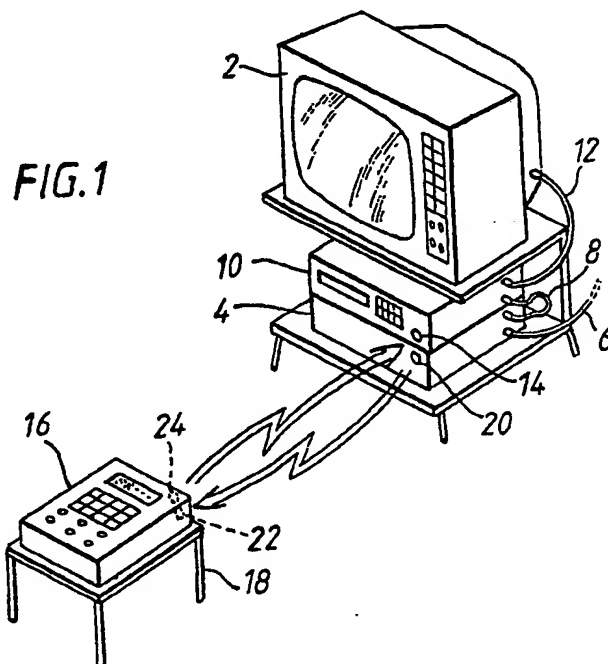
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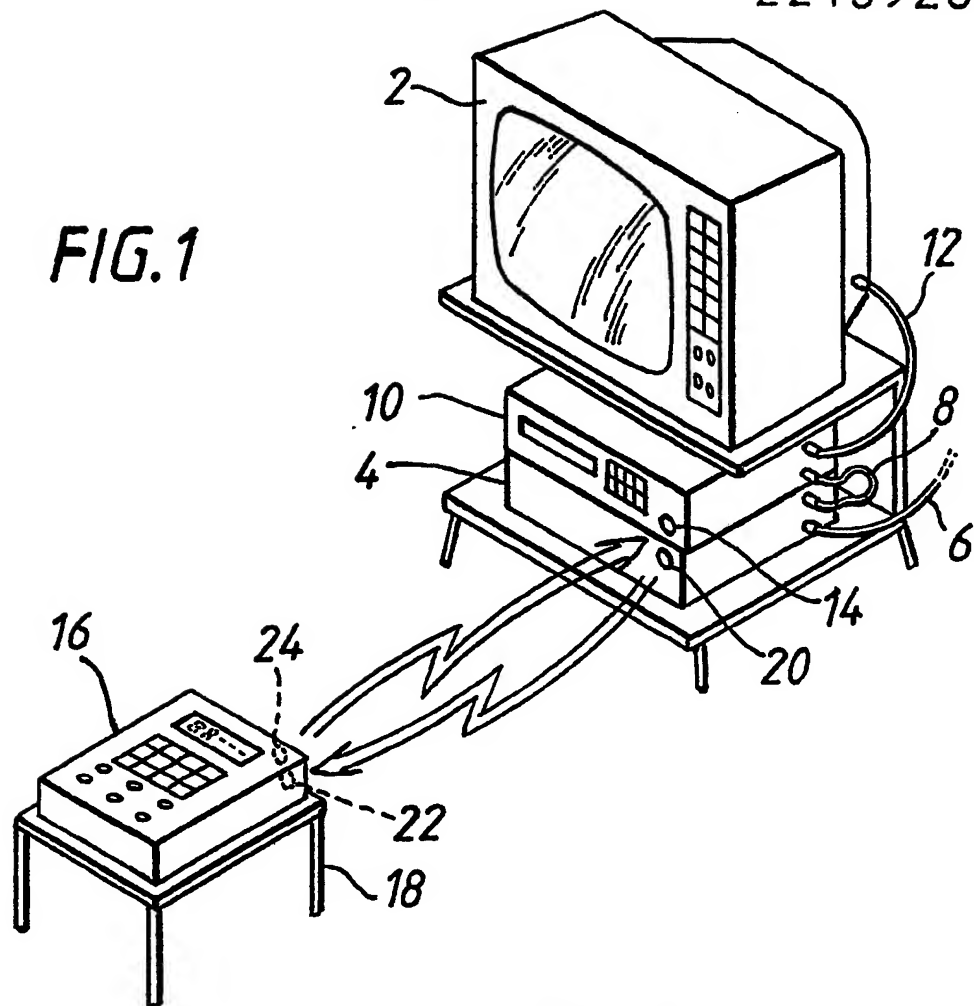
(54) **Controlling a video recorder by a coded broadcast signal**

(57) A control system for a video recorder involves the transmission of numerical codes associated with different programmes and the generation of control signals for turning the video recorder on and off in response to detection of predetermined numbers in the received television signal, whereby predetermined television programmes may be recorded without the need for setting into the video recorder the date and time at which the programmes are expected to be received. The decoder unit includes an infrared transmitter which transmits the received numbers to a remote control unit which compares the received numbers with prestored numbers representing the programme to be recorded and transmits a start instruction, by infrared, to a video recorder when the received and prestored numbers match. The remote unit is programmable to render it compatible with different video recorders. The apparatus may include a decoder unit which has means for descrambling encrypted television signals and means for extracting the programme numbers from the received signal.

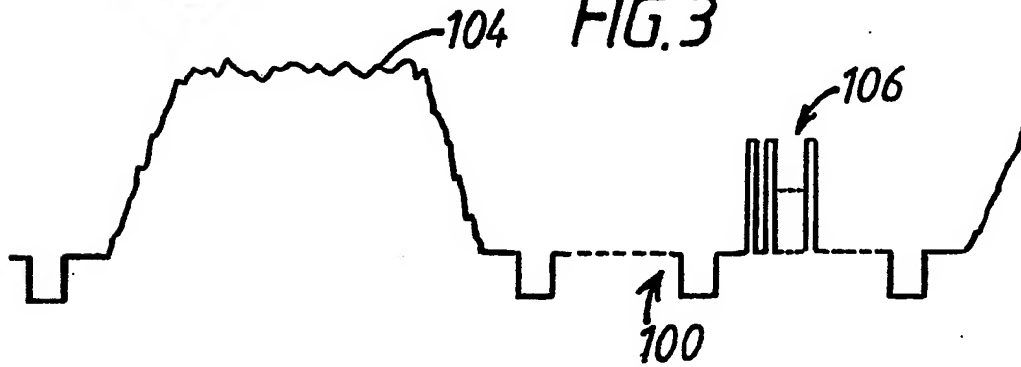


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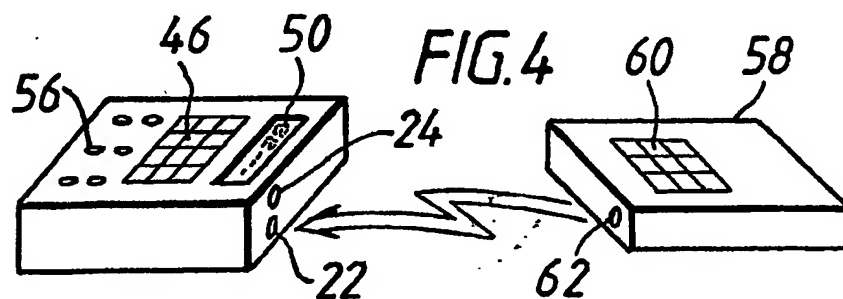
**FIG. 1**



**FIG. 3**



**FIG. 4**



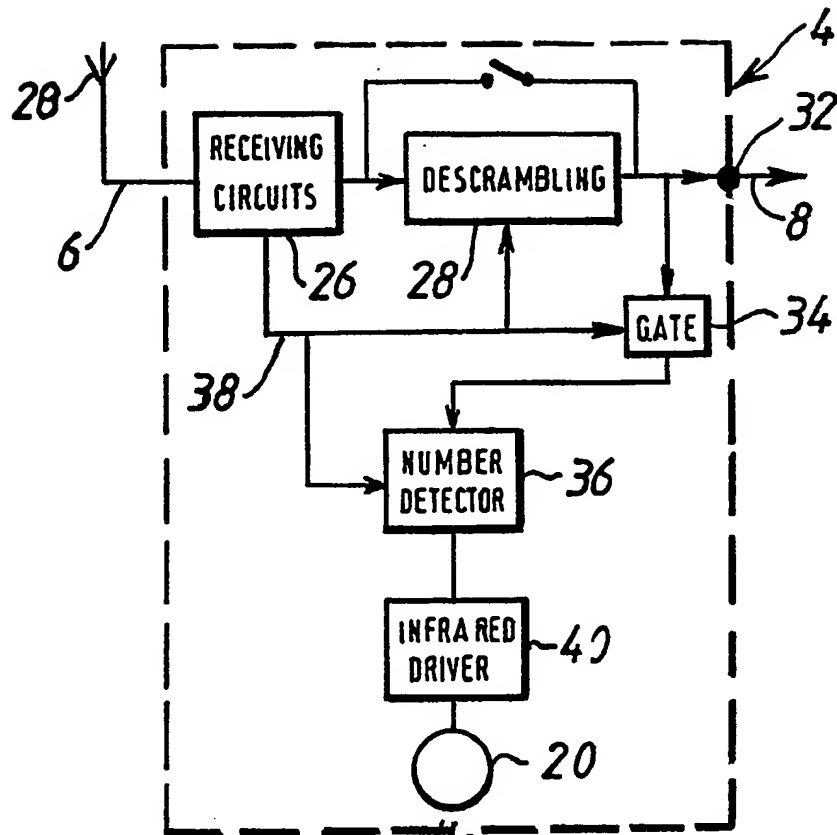
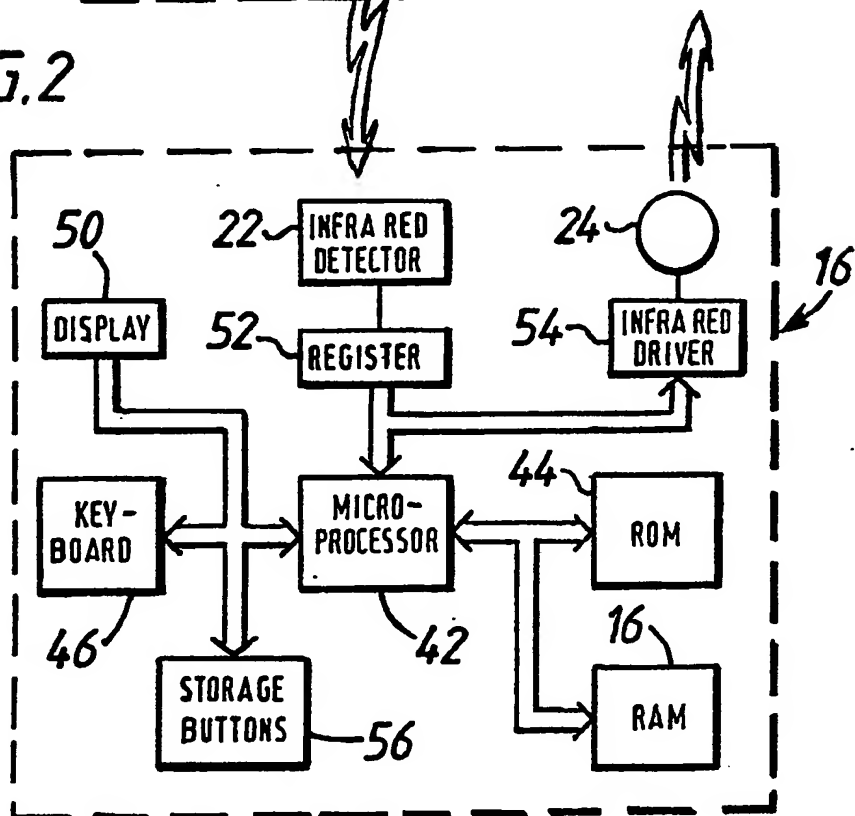


FIG. 2



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METHOD AND APPARATUS FOR CONTROLLING A VIDEO RECORDER

This invention relates to a method and apparatus for controlling a video recorder and is particularly, but  
5 not exclusively, applicable to the recording on a home video recorder of programmes transmitted in a pay TV system.

Video recorders are well known having a control system  
10 which enables them to be set into the record mode at predetermined times on predetermined days so that predetermined broadcast television programmes may be recorded in the absence of the owner of the video recorder.

15 One problem with such recorders is that the preprogramming operation is relatively complex and many users experience difficulties, to a greater or lesser degree, in carrying out this operation. A  
20 further problem is that, from time to time, broadcast programmes are not transmitted at the scheduled time and as a result the preprogrammed recorder may fail to record the whole or part of the required programme.

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One aspect of the invention aims to solve these problems.

5 The invention is described further, by way of example, with reference to the accompanying drawings in which:

10 Fig. 1 illustrates diagrammatically apparatus in accordance with a preferred embodiment of the invention in operative relationship with a domestic television receiver and video recorder;

15 Fig. 2 is a block diagram illustrating the preferred embodiment of the invention;

Fig. 3 illustrates diagrammatically a portion of a television signal utilised by the preferred embodiment of the invention; and

20 Fig. 4 is a diagram showing part of the apparatus of Fig. 2 arranged for the performance of a setting up operation in association with a remote control device of a video recorder.

With reference to Fig. 1 a domestic TV receiver 2 is arranged for receiving both signals from a public broadcast television system, such as the BBC and ITV, and signals from a pay television system for which purpose a decoder 4 is provided. The decoder 4 receives broadcast signals intended for the receiver 2 from coaxial cable 6 and is connected via coaxial cable 8, a video recorder 10 and further coaxial cable 12 to the receiver 2.

10

The recorder 10 includes an infrared receiver 14 for receiving control signals, such as for turning it on and off, from a remote control unit 16 which is shown supported on a suitable piece of domestic furniture such as stool 18. The decoder 4 includes an infrared transmitter 20 for transmitting infrared signals to the remote control unit 16 which accordingly has an infrared receiver 22. Unit 16 also has an infrared transmitter 24 and includes circuitry, to be described in detail below, which causes the transmitter 24 to transmit appropriate control signals to the recorder 10, such as to turn it on or off, in dependence upon the infrared signals received by the receiver 22.

15

20

With reference to Fig. 2, the decoder 4 includes receiving circuitry 26 which is coupled to a suitable aerial system 28 via the coaxial cable 6, de-scrambling circuitry 28, a by-pass switch 30 for the descrambling circuitry and an output terminal 32 which is connected to the coaxial cable 8 and may receive signals from the receiving circuitry 26 either through the descrambling circuitry 28 or via the by-pass switch 30. As is well known, it is necessary that signals transmitted in a pay television system should in some way be scrambled or encoded to prevent unauthorised users from viewing the transmitted programmes. Various scrambling or encoding systems are known and form no part of the present invention. Thus, the scrambling method used for the signals 104 may be conventional and will not be described further.

In accordance with a preferred aspect of the invention, each transmitted programme is assigned a unique number and this number is transmitted, in encoded form, in the interval indicated diagrammatically at 100 in Fig. 3 between successive fields. The encoded number is indicated diagrammatically at 106 in Fig. 3 and 104 indicate scrambled video. Thus, the unique number identifying the programme is transmitted once every field.

Alternatively, it would be possible to transmit at other intervals such as once each frame. Preferably, the number identifying the programme has a value between 0 and 999. The programme numbers may be  
5 changed every month and published along with the programme schedules of the television system so that subscribers will know the numbers assigned to the various programmes to be transmitted.

10 In accordance with a further preferred aspect of the invention, the number of the programme received by the decoder 4 is extracted and utilised to control the video recorder 10 via the remote control unit 16. For this purpose, the output of the descrambling circuitry  
15 28 is applied via a gate 34 to a number detector 36. The gate 34 is controlled by synchronising signals, derived from the input circuitry 26, and applied to the gate 34 via line 38, which is also connected to the descrambling circuitry 28 for controlling the  
20 timing of operations therein. The gate 34 is accordingly opened during the frame blanking pulses so that the transmitted programme numbers may be supplied to the number detector 36. The number detector 36 controls a driver 40 which causes the infrared  
25 transmitter 20 to transmit the number detected by number detector 36 to infrared receiver 22 of remote



control unit 16. Number detector 36 is also connected to line 38 so as to be reset to zero after transmission of the number. In this way, the programme number is transmitted by transmitter 20 once each frame.

The remote control unit 16 comprises a microprocessor 42 controlled by programs stored in a ROM 44, and a keyboard 46 for inputting numerical data to the microprocessor 42, which data is stored by the microprocessor 42 in a non-volatile RAM 48 and is also displayed on a display 50. Numbers received by the infrared detector 22 are stored in a register 52 which may in practice be part of microprocessor 42. An infrared driver 54 which is connected to the microprocessor 42 for control thereby drives the infrared transmitter 24 for sending control signals to the infrared receiver 14 of the video recorder 10. The remote control unit 16 also includes a set of storage instruction buttons 56 which are to be used in setting up the control unit 16 for operation. Buttons 56 are preferably located in small recesses for actuation by the tip of a ball-point pen or the like.

Commercially available video recorders are normally

sold with a hand-held remote control unit such as indicated at 58 in Fig. 3. Such remote control units are used to send numerical signals for controlling the operation of the video recorder 10. Thus, the  
5 hand-held remote control unit 58 includes a keyboard 60 having a number of different keys (not individually shown) each for instructing transmission, via infrared transmitter 62, of a different instruction to the infrared receiver 14 of the recorder 10. Such  
10 instructions may comprise instructions for start, stop, fast rewind, fast forward etc. Each instruction normally comprises a number unique to that instruction, which number is transmitted by the transmitter 62. However, there is no agreed standard  
15 between different manufacturers as regards these numbers and accordingly the numbers required by the video recorder in order to carry out the various functions will differ according to manufacturer and/or according to model. Thus, in order for unit 16 to  
20 control the recorder 10 satisfactorily, it is necessary to ensure that the instructions it transmits are compatible with the recorder 10.

In accordance with a preferred aspect of the  
25 invention, unit 16 is programmable to render it compatible with different video recorders. In the

illustrated preferred embodiment, this is achieved by causing the unit 16 to read the various instruction signals from the remote control unit 58 of the recorder 10. Thus, in order to set up the unit 16 in preparation for use, it is positioned initially as shown in Fig. 3 so that its infrared detector 22 may receive signals transmitted by the infrared detector 62 of the unit 58. With the two units in this position, one of the keys on pad 60 is pressed, for example that key which instructs the video recorder 10 to record. The transmitter 62 thus transmits the number which the recorder 10 interprets as a "start to record" instruction. This number is thereby received by the detector 22 and stored in the register 52. Each of the buttons 56 is associated with a different control function, in particular the functions start, stop, rewind etc. After transmission of the "start instruction" signal from the transmitter 62, the "start instruction" button of the set of buttons 56 is depressed and the microprocessor 42, in response to this, reads the number in register 52 and stores it in RAM 48 in an address location reserved for the number representing the "start to record" instruction.

Next, another of the buttons in pad 60 is pressed, such as the "stop" button and the number transmitted by transmitter 62 in response thereto is thereby stored in register 52 in unit 16. The corresponding  
5 button of the set of buttons 56 is then depressed and the microprocessor 42 is caused to store the number in register 52 in RAM 46 in a further address location reserved for the number representing the "stop" instruction. This process is continued using different  
10 buttons of the pad 60 and corresponding buttons of the set 56 in order to record in RAM 48 the numbers required by the recorder 10 for performing any other required functions, such as rewind. In this way, the unit 16 is rendered compatible with the recorder 10.

15

Thereafter, in order to cause the recorder 10 to record selected programmes to be transmitted in the pay television system, all that is needed is to enter the numbers of these programmes into unit 16. This is  
20 achieved utilising keyboard 46 in response to operation of which the number is firstly displayed on display 50 and, once the user is satisfied that it is the correct number, it may be transferred to RAM 48 for storage therein in response to depression of  
25 another one of the buttons 56. The numbers of several programmes may be simultaneously retained in RAM 48.

The apparatus may thereafter be left arranged as shown in Fig. 1 with the unit 16 positioned so that its detector 22 may receive infrared signals from the transmitter 20 of the decoder 4 and so that its  
5 transmitter 24 may transmit signals to the detector 14 of the recorder 10. Thus, at any given time, the register 52 will store the number of the programme being transmitted over the pay television system. The microprocessor 42 continuously compares this number  
10 with the programme numbers which have been stored in RAM 48. At some point, a match will be detected and, in response thereto, the microprocessor 42 accesses from the RAM 48 the number representing the start instruction of the video recorder 10 and causes  
15 transmitter 24 to transmit this number to the receiver 14, in response to which the video recorder 10 will begin to record. Preferably, the microprocessor 42 is programmed to transmit the start instruction to the video recorder 10 a number of times with a view to  
20 ensuring that the instruction is received and acted upon and thereafter to cease transmission of the start instructions even though a match continues to be obtained between the stored programme number and the number which is received by the register 52 each  
25 frame.

When the programme has finished, transmission of that particular programme number ceases. This is recognised by the microprocessor 42 when carrying out the next comparison of the number stored in register 52 with the programme number stored in RAM 46 since, assuming that the next programme is not to be recorded, no match will be detected. In response to the no match situation, the microprocessor obtains from RAM 48 the number representing the stop instruction for the recorder 10 and causes this to be transmitted by transmitter 24, in response to which recording is stopped. Preferably the stop instruction is transmitted a number of times to ensure that it is received by the recorder 10 and acted upon, and thereafter transmission of the stop instruction terminated. Recording will be started again next time the microprocessor determines that the programme number received into register 52 corresponds to one of the programme numbers stored in RAM 46.

Various modifications are possible within the scope of the invention. For example, users of video recorders sometimes forget to rewind the video tape. If desired, a rewind instruction could be transmitted periodically, for example say once every few frames, which would cause the unit 16 to transmit a rewind

instruction to recorder 10. The rewind instruction would be disabled by microprocessor 42 once it has been executed following the entering of programme numbers via the keyboard 46 since otherwise repeated  
5       rewinding would take place.

Although the invention has been described in connection with TV systems in which programmes are numbered and the programme number transmitted along  
10       with the signal containing the programme, whereby the unit 16 may recognise the programme being transmitted, this is not essential. For example, other means for recognising that a particular programme is being, or is about to be, transmitted could be provided.

15       Further, although the programmable unit 16 has been provided separately from the decoder 4, it could alternatively be embodied in the decoder 4 provided that provision is made for transferring the required  
20       control instructions to the recorder 10, for example by a direct or indirect infrared link or otherwise.

Although in the embodiment described with reference to the drawings it has been assumed that the programme  
25       number has been transmitted with each frame or field blanking pulse of the signals associated with the

programme to be recorded, and has been continued throughout the programme, alternatives are possible. For example, the programme number could be transmitted shortly in advance of the programme with which it is associated. Thus, for example, programme numbers might be transmitted only for a short period between programmes, in which case the unit 16 would be arranged to operate accordingly. Further, although in the embodiment shown in the drawings, the programme number has been transmitted in the intervals between fields or frames, it could, alternatively or in addition, be transmitted at other times, for example during the line blanking pulses or even during the video signal in which case care may be taken to ensure that it does not interfere unduly with the reproduced picture. In the latter connection, it will be appreciated that the "number" transmitted will be encoded in the form of additional modulation on the transmitted signal, the number being preferably represented in binary form.



CLAIMS:

1. Apparatus for controlling a video recorder, comprising receiving means for receiving television signals, electronic means for recognising from the signals received by said receiving means that a predetermined programme is being, or is about to be, received, and means responsive to said electronic recognising means for generating control signals for a video recorder for causing the recorder to record the predetermined programme.

2. Apparatus according to claim 1, wherein said electronic means is arranged for recognising a numerical code included in the received signals and identifying the predetermined programme.

3. Apparatus according to claim 2, wherein said electronic means is operable for recognising said numerical codes received in intervals between frames and/or fields of said television signal.

4. Apparatus according to any preceding claim, comprising a first unit containing at least said receiving means and a second unit containing at least said generating means, and including means for linking

said remote control unit both to said first unit and to a video recorder.

5        5.     Apparatus according to any preceding claim, including presetting means permitting the apparatus to be set into different conditions in which it is compatible with respective different video recorders.

10       6.     Apparatus according to claim 5, wherein the presetting means include infrared receiving means for receiving infrared signals from a controller associated with a recorder with which the apparatus is to be used, and storage means for storing representations of said infrared signals, said  
15       generating means being operable to generate said control signals in accordance with said stored representations of said infrared signals.

20       7.     Apparatus according to any preceding claim for use in a subscriber or pay television system, wherein said receiving means includes a decoder for decoding television signals transmitted in said subscriber or pay television system.

8. A remote control unit useful with any of a number of different video recorders comprising an infrared transmitter for transmitting control signals for a video recorder, an infrared receiver, means for  
5 storing representations of signals received by said infrared receiver and means for causing said infrared transmitter to transmit said control signals in a form dependent upon said stored representations so that said transmitted control signals correspond to said  
10 received signals.

9. A unit according to claim 8, including means for storing numbers representing predetermined programmes to be recorded, means for receiving numbers associated  
15 with television signals being, or about to be, received, and means for causing said transmitter to transmit a control signal representing a start instruction in response to reception of a said associated number which corresponds to a said stored  
20 number.

10. A decoder for a television system comprising means for receiving television signals, means for extracting from said signals numbers representing  
25 programmes being or about to be transmitted, and

infrared transmission means for transmitting said numbers to a remote unit.

5 11. A television system which comprises transmission means arranged for transmitting television signals and different numerical codes associated with respective different transmitted programmes; and receiving means operable for receiving said television signals and having means for generating control signals for a  
10 video recorder in response to said numerical codes.

12. A decoder substantially as herein described with reference to the accompanying drawings.

15 13. A remote control unit substantially as herein described with reference to Fig. 2 of the accompanying drawings.

20 14. Apparatus for receiving and recording television signals substantially as herein described with reference to the accompanying drawings.